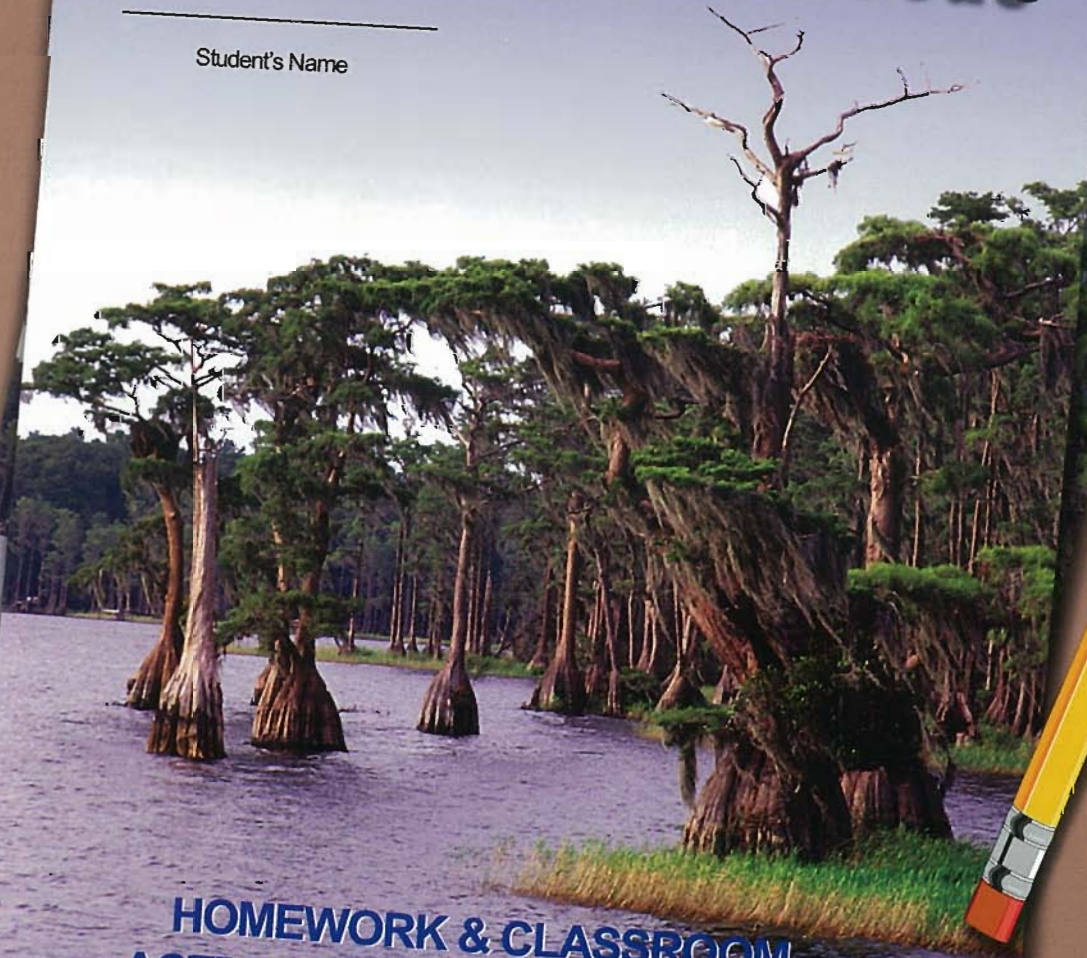


Aquatics

Spring 2002

Understanding Invasive Aquatic Weeds

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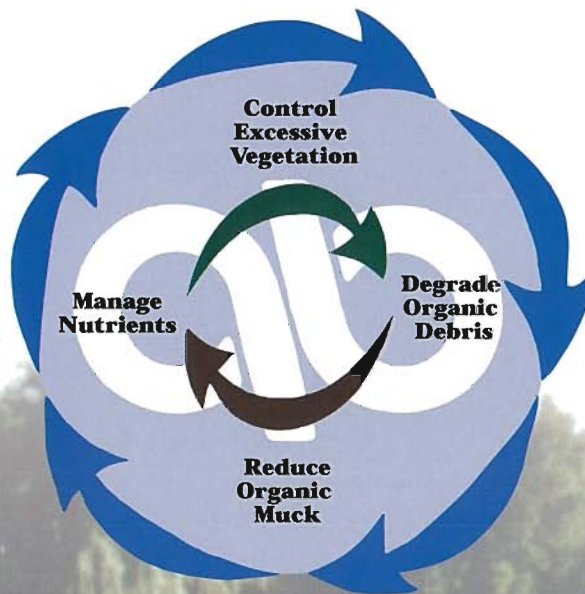
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Editorial

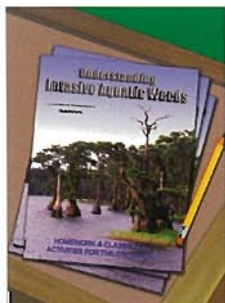
President Dwight Eisenhower warned in his farewell address of the rise of the Military-Industrial Complex. Today, Florida faces the *Environmental-Industrial Complex*. As with the Military-Industrial Complex, the new Complex's influence is best described by President Eisenhower's prophetic words. "The total influence - economic, political, even spiritual - is felt in every city, every state house and every office of the federal government." He further warned that the Military-Industrial Complex was affecting research and universities. "The Prospect of domination of the nation's scholars by federal employment, project allocation, and the power of money is ever present - and is gravely to be regarded." This warning applies in Florida because it is not just federal dollars, but state dollars that fuel the Environmental-Industrial Complex.

President Eisenhower provided a final warning. "Yet in holding scientific research and discovery in respect, as we should, we must be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite." These words apply directly to the issues at Lake Okeechobee as well as the restoration efforts at the Everglades and Lake Apopka. There is no doubt that there are many individuals, including many in the scientific community, who strongly believe that Lake Okeechobee is threatened by eutrophication. There, however, are alternative interpretations and it must be recognized that the philosophy of the scientists and management agencies influences interpretation of data. Alternative interpretations of the data may not be addressed adequately in any single report.

Alternative interpretations of the data also should not be discounted because they fail to agree with the current "conventional wisdom." However, the evidence at Lake Okeechobee indicates that additional expensive phosphorus control activities will do little to improve the lake's water quality in a reasonable time frame. It

Continued on page 18

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This is the cover of the "Understanding Invasive Aquatic Weeds" booklet which shows a view of Santa Fe Lake, Florida from Jimmy Pennington's Boat Dock. See page 4 for more information.

Photo by Jeff Schardt.

Aquatics

Spring 2002/Vol. 24, No. 1



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The Invasive Aquatic Plant Education Booklet Becomes a Reality

By Jeff Schardt

On February 7, 2002, the first of 400,000 copies of the Aquatic Plant Management Society's 5th grade education booklet on invasive aquatic plants were forwarded from the printer to distribution centers. The APMS elementary education project began modestly four years ago with the acquisition and distribution of 7,000 invasive plant packets from the Intermountain Ag Foundation. These packets contained color photos, text, and student activities on 10 upland and aquatic invasive species from across the country. While the message was important and the format effective, the APMS wanted an educational instrument that focuses exclusively on the problems caused by, and management solutions available for, invasive aquatic plants.

During 2000, the APMS Education and Outreach Committee drafted an eight-page, two-sided loose-leaf packet with information and classroom activities relating to five aquatic plants that cause or pose national or broad regional problems in the US. These plants are hydrilla, water hyacinth, Eurasian watermilfoil, purple loosestrife, and giant salvinia. Teachers and student reviewers agreed that the subject material was too complex for the originally intended 3rd grade audience, suggesting that the 5th grade might be more appropriate. They also recommended more color, highlighted text boxes, and binding the pages into a booklet to present the message in a format more familiar to today's students. All of these changes were made within the original \$73,000 per year budget while allowing production

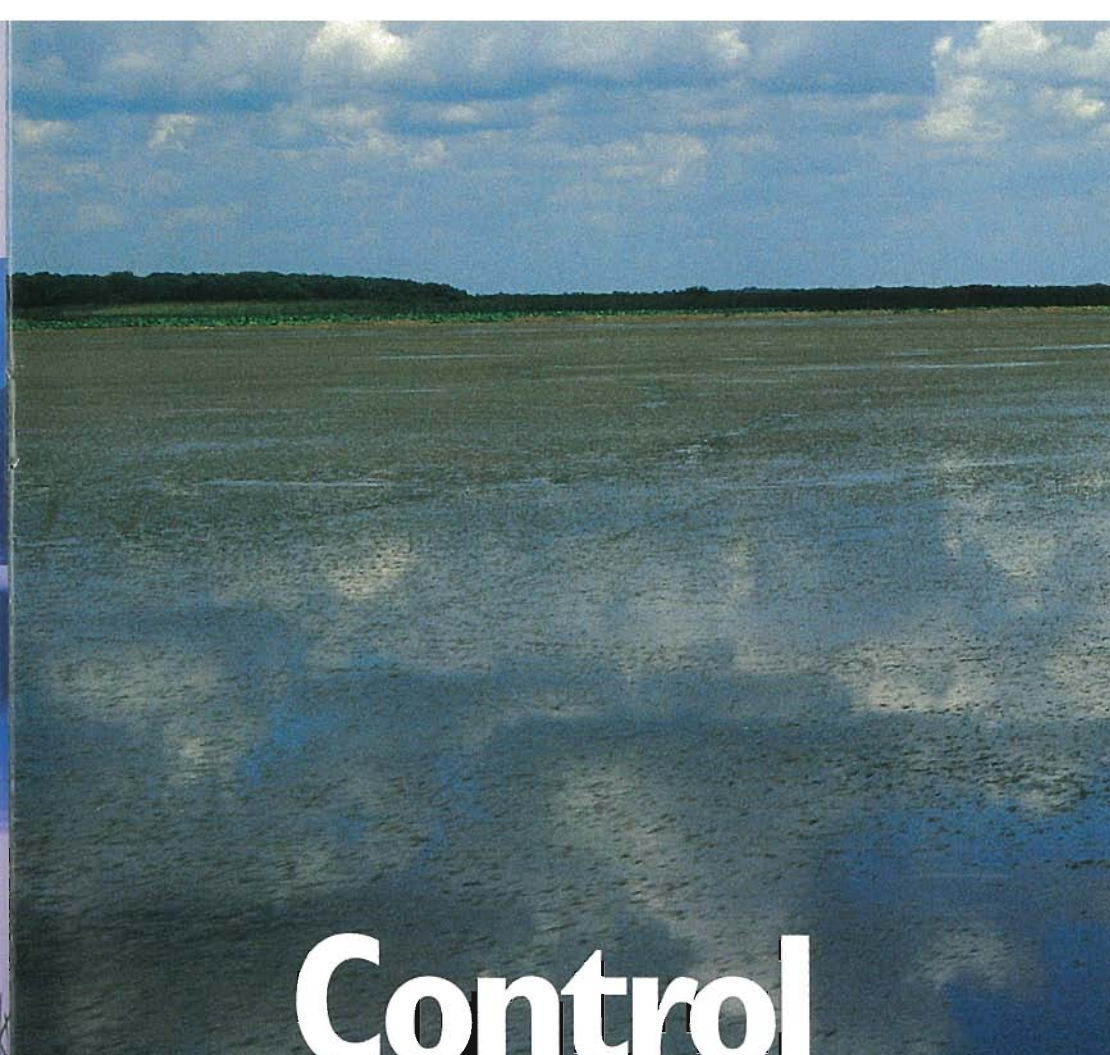


Hydrilla ...
 Hydrilla is a submersed plant that was brought to Florida in the 1950s from Asia to grow in aquariums. Back then hydrilla was planted in canals and rivers and picked to sell in pet stores. Hydrilla can grow more than an inch each day and can fill water bodies that are as deep as 15 to 20 feet in only one year. When it reaches the water surface, hydrilla grows across the top of the water forming tangled mats of plants. These mats wrap around propellers and make boating almost impossible. They also slow water flow and jam against bridges and dams, which can cause flooding. Hydrilla mats form a cover over water bodies, like an umbrella, that will not allow light or oxygen into the water, killing native plants, fish and other wildlife.

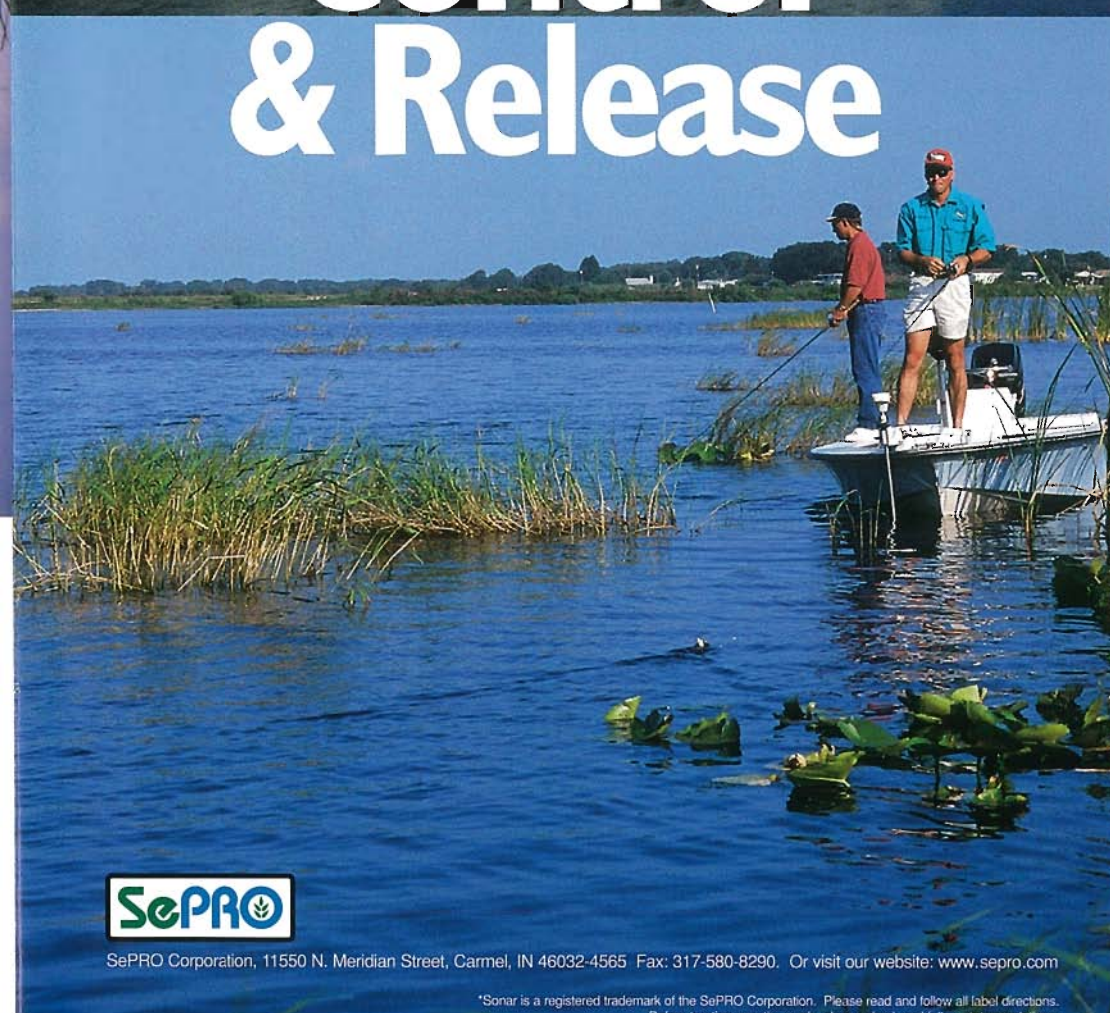
Hydrilla does not form seeds. New plants sprout from the roots and from broken stems. Each piece of stem can form its own roots and start a new plant. Hydrilla also forms buds on the stems and roots. The root buds, called tubers, can lie in the sand or mud for years before they sprout. Once hydrilla makes tubers, it is almost impossible to eradicate. Ecosystem managers use biological, mechanical, and physical controls along with herbicides to control hydrilla so it causes fewer problems. Because hydrilla can cause so many problems there are now strict laws that prohibit owning or planting hydrilla in the United States.

Homework activity: Scientists track the spread of invasive weeds like hydrilla on maps. See how far hydrilla has spread across the United States since it was brought to Florida about 50 years ago. Write the number next to the states listed below on the correct state on the map. Color these states red. These states have hydrilla problems.

1. Florida
2. North Carolina
3. Tennessee
4. Louisiana
10. Maryland
11. Mississippi
12. Arizona
13. Pennsylvania
14. Delaware
- California



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The final 5th grade invasive aquatic plant booklet is far different from bureaucratic-looking drafts you may have seen during 2001. The opening messages on invasive plant origins, problems that they cause, and management strategies are still there. The full-page color photos showing invasive plant problems with inserts depicting plant details

and management operations still accompany text specific to each plant along with homework activities. The difference is the enthusiastic critiques from teachers and students, and the generous contributions from sponsors have culminated in a high-quality educational product that will reach hundreds of thousands of children and their parents.

This project is not ending, but

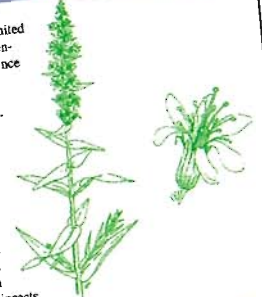
rather is just beginning with the printing. APMS has partnered with the National Sea Grant Foundation to distribute more than 300,000 of the booklets across the country to teachers interested and trained in environmental sciences. In this way, we are assured the product will be put to good use. Nearly 55,000 copies will be distributed among



Purple Loosestrife

Purple loosestrife is an invasive wetland weed that came to the eastern United States about 200 years ago from **Eurasia**. Seeds may have traveled accidentally in ships or people may have planted purple loosestrife on purpose since it was used as a medicine for stomach problems. People spread purple loosestrife across North America to add color to wetlands and water gardens. It now causes problems in all 50 states except Florida. Purple loosestrife clogs irrigation canals and replaces native plants in wetlands and along lake and river shorelines. It is so bad in some places that people nickname it marsh monster and exotic invader.

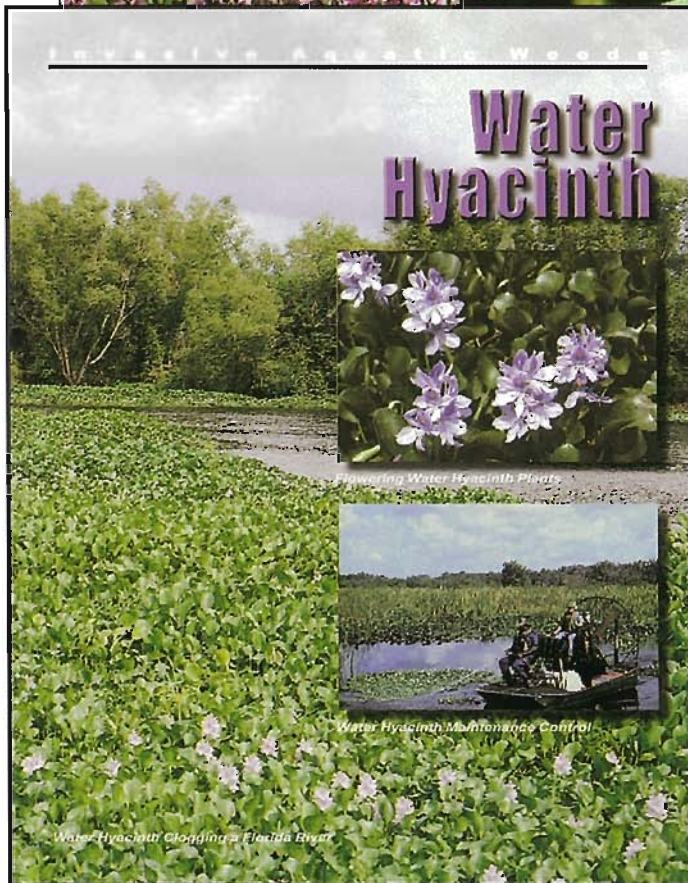
Purple loosestrife grows and spreads quickly in wet soils. It grows to almost six feet tall. Each plant flowers for about four months and produces two to three million seeds. Mowing purple loosestrife in roadside ditches spreads the seeds that stick to the mowing equipment and are carried to new areas. New plants also shoot up from the roots. Small amounts of plants can be dug out by hand. Herbicides are often brought in from Europe that feed only on purple loosestrife leaves, roots, and seeds.



Homework activity: Although poetry does not always follow strict rules of grammar to get its point across to the reader, the same components that make up sentences can be found in a line of poetry. Read the poem below about purple loosestrife then write words indicated on the blank lines to the right.

Marsh Monster

verb(s)



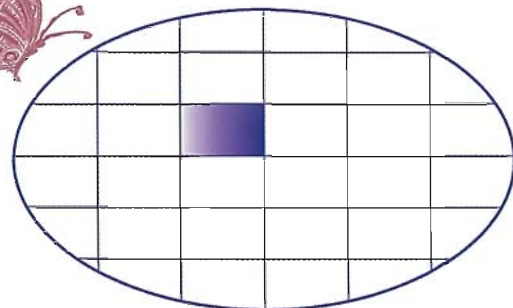
Water Hyacinth

Water hyacinth is one of the world's worst aquatic weeds. Gardeners who liked its beautiful lavender flower brought water hyacinth into the southeastern United States from South America during the late 1800s. It grew so fast that it quickly filled ponds and unwanted plants were thrown into nearby lakes and rivers. Ranchers also planted water hyacinth in ponds, lakes, and rivers to feed cattle. It turned out that cattle did not much like water hyacinth, but it was too late, water hyacinth was too widespread to eradicate. Each plant forms millions of tiny seeds. New plants also grow from buds on the parent plant.

Water hyacinth is one of the fastest growing plants known. Left alone, it can double the area that it covers in as little as two weeks. Since it floats, large mats or rafts of water hyacinth can drift in lakes and rivers and cause problems like stopping boats, clogging irrigation pipes, pushing over bridges, providing places for mosquitoes to live, and covering up native plants that are good for fish and wildlife. Large mats of water hyacinth also use up most of the oxygen in a water body so animals underneath cannot breathe.



Homework activity: Although ecosystem managers cannot completely get rid of water hyacinth, they can keep it from becoming a problem by controlling small patches of plants before they grow into big mats. Water hyacinth covers one small area shown as the shaded block in the pond below. If water hyacinth can double every two weeks, color how many blocks would be covered in two weeks (green), four weeks (blue), and six weeks (red).

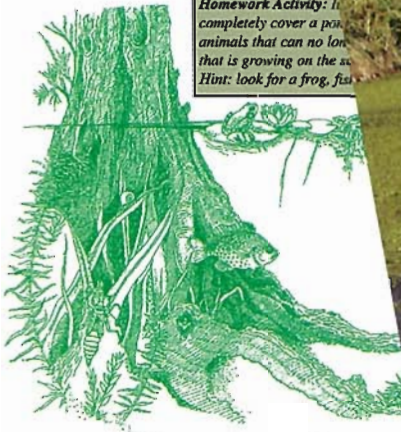


Giant Salvinia

Giant salvinia is a small floating fern from South America. People plant it in aquaria and outdoor gardens because of its unusual and delicate appearance. Although the leaves are only 1/2 to 1 inch long, as plants grow older they form clumps that quickly cover the surfaces of lakes, canals, and rivers. The plants also pile up in dense mats that are several inches thick and block sunlight that native underwater plants need to grow. They also prevent oxygen from entering the water, suffocating fish and other aquatic animals. They also slow down and jam against bridges and dams, causing flooding and blocking irrigation pipes.

Once giant salvinia enters a large water body, it is almost impossible to eradicate. Each plant is small and hard to see, and some of the problems salvinia caused terrible problems after it was released in America. Strict laws that prohibit owning or planting giant salvinia in some states prevent giant salvinia from being planted in some waters. Attention to the laws carry giant salvinia to new water bodies along with herbicides to keep giant salvinia under control so

Homework Activity: If plants completely cover a pond, animals that can no longer breathe that is growing on the surface.
Hint: look for a frog, fish



13



APMS (20,000) and the regional chapters (4,800 each). The University of Florida will attach a booklet (a total of 10,000) to each invasive and native aquatic plant poster, sent free to teachers, to stimulate additional interest. Finally, the US Fish and Wildlife Service will distribute 25,000 copies at their hands-on exhibits at wildlife refuges, and has expressed an interest in donating \$15,000 for an additional 60,000 copies next year.

The APMS elementary education project is funded for two years. The first year's effort will be revised upon receiving comments and the second edition will be reprinted in late 2002. APMS leadership will need to assess the booklet's effectiveness via input from teachers and from the regional chapters. Comments will be compiled on the APMS web site. Your ideas will help to improve next year's edition and determine the future of the elementary education booklet.

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Photo by Jeff Schardt

Will Stringent Phosphorus Control Improve the Quality of Lake Okeechobee?

Dr. Daniel E. Canfield, Jr.

Nutrient enrichment (eutrophication) has been recognized as a major environmental problem for 50+ years because of an association with fish kills and aquatic weed problems. A 310-km² algal bloom

Dr. Daniel E. Canfield, Jr. is a Professor of Limnology in the Department of Fisheries and Aquatic Sciences at the University of Florida. He also served as President of the North American Lake Management Society (NALMS); an international society dedicated to the management of lakes. *For more Aquatics articles on Lake Okeechobee please refer to 1987, Volume 9, June and September.*

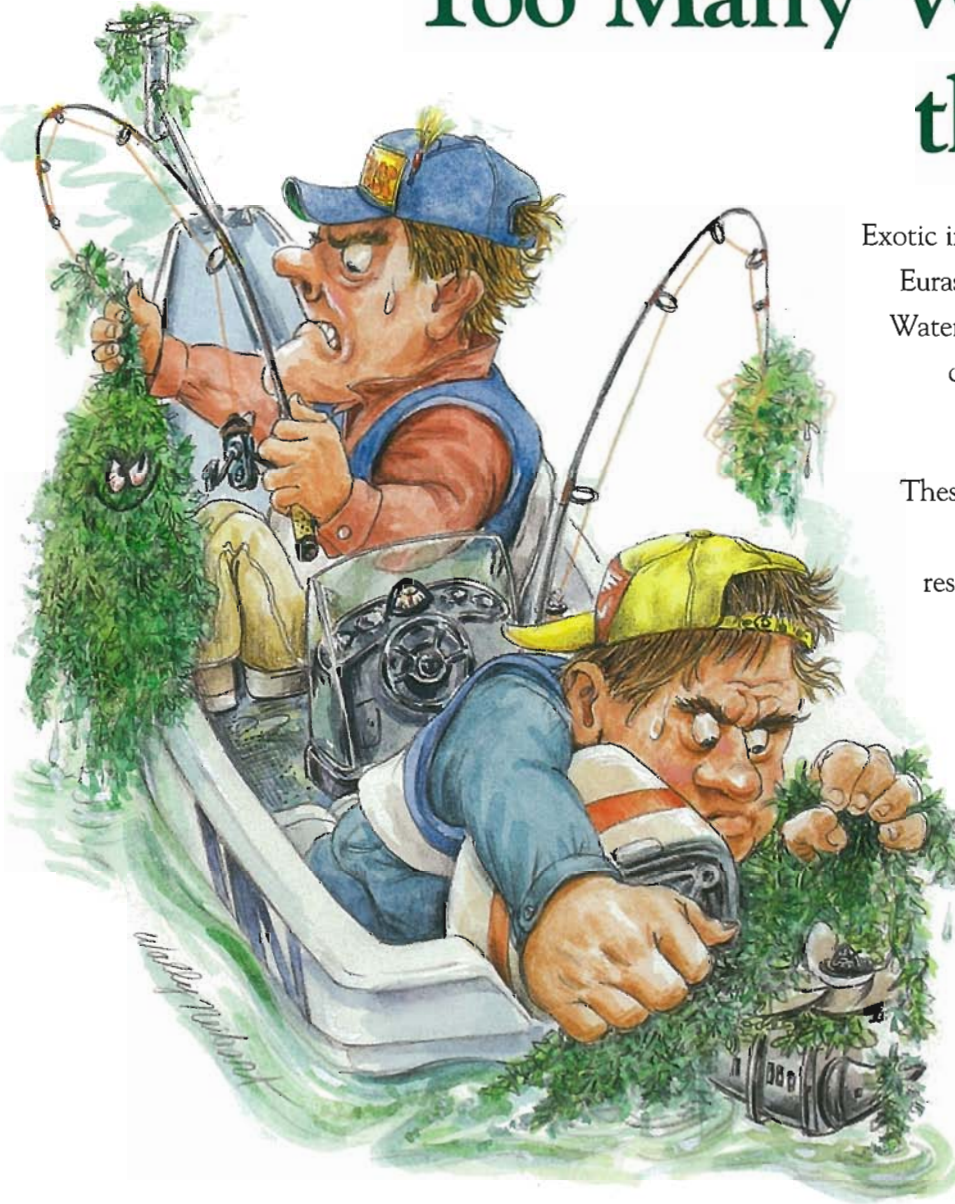
occurred in the western quarter of Lake Okeechobee in August 1986¹. This algal bloom raised fears that one of the nation's richest and most famous sportfisheries was about to collapse. Political forces made a decision that nutrient control was needed to reverse the perceived adverse effects of eutrophication.

The Lake Okeechobee Technical Advisory Committee (LOTAC) recommended in the mid-1980s that total phosphorus (TP) inputs to the lake should be reduced by at least 40% to protect long-term water quality². Scientific evidence indicated that nutrient control would not improve overall lake quality³. Regardless, a costly nutrient control program was

implemented. The clean-up program has now cost hundreds of millions of dollars and drove out of business over 20 dairies.

Record high open-water TP concentrations (120 µg/L) were measured in 1996 and 1998. This alarmed environmental groups and led to the belief that the situation at Lake Okeechobee was an emergency. South Florida Water Management District (SFWMD) stated millions of new dollars for reservoirs, marshes, and dredging projects north of the lake were needed. The debate, however, soon became more than just a political and scientific debate in 1998. A U.S. Court issued a Consent Decree that

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required the U.S. Environmental Protection Agency (USEPA) and State of Florida to establish a Total Maximum Daily Load (TMDL) for TP at Lake Okeechobee (Florida Wildlife Federation et al. v Carol Browner et al., Case No. 98-356-CIV-Stafford). USEPA proposed a TP goal of 40 $\mu\text{g}/\text{L}$ and a TMDL of 198 metric tons of TP per year in January 2000⁴.

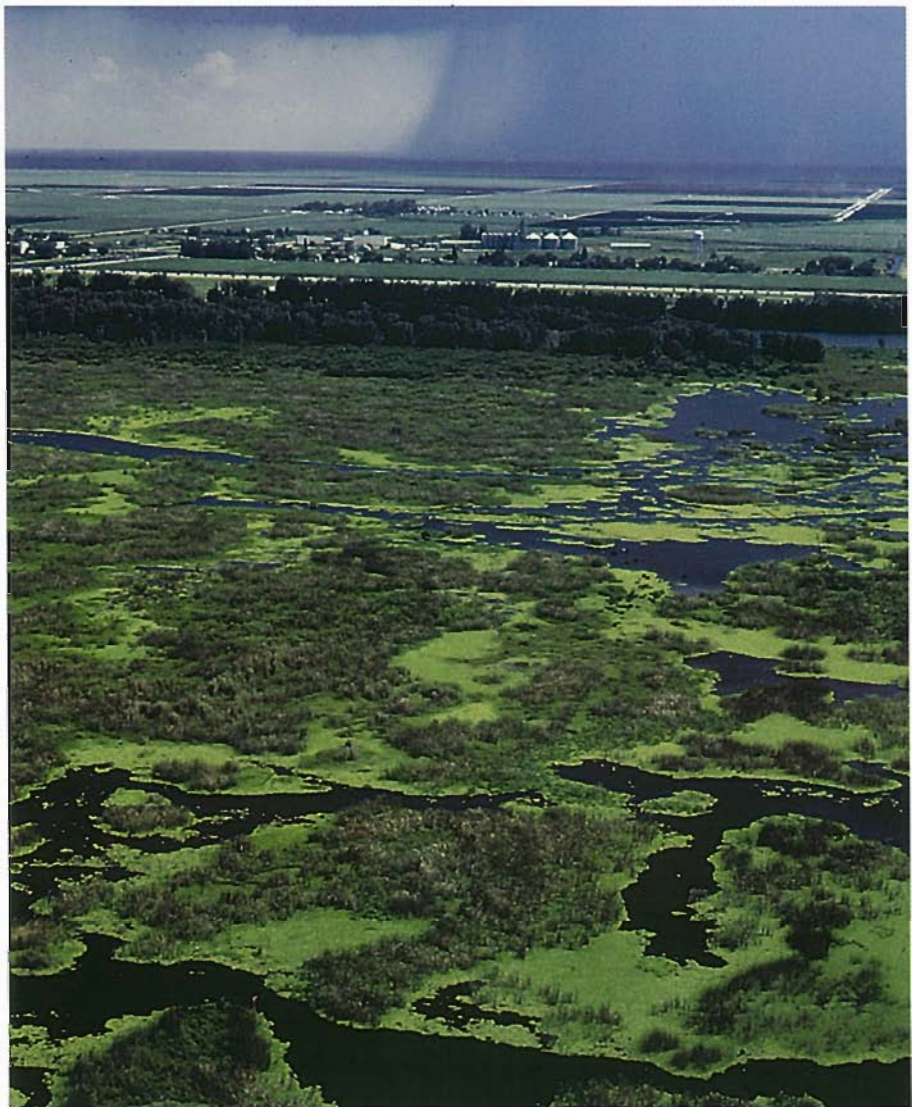
In this article, I review the eutrophication issue at Lake Okeechobee using SFWMD's 26-year water quality database. My conclusion, contrary to "conventional wisdom", is that Lake Okeechobee is not threatened by excessive TP inputs. Proposed TMDLs are unrealistic and will needlessly increase land-use regulations, adversely affect local tax-bases, and misdirect scarce public resources. More importantly, issues such as aquatic plant management are likely to be given less attention than they deserve as SFWMD focuses on phosphorus control.

Open-water TP Concentrations versus External Inputs

Open-water TP values at Lake Okeechobee were about 50 $\mu\text{g}/\text{L}$ prior to the mid-1970s, but increased to over 90 $\mu\text{g}/\text{L}$ in the 1990s (Figure 1a). Agriculture activities, especially dairy operations, were blamed, but no relationship has been established between TP values and nutrient inputs for the 26 years (Figure 1a, b)!

Measured external phosphorus inputs have averaged slightly over 460 metric tons between 1973 and 1998. Phosphorus inputs dropped from 812 metric tons in 1982 to 253 metric tons in 1993, suggesting to many individuals that nutrient control was working. But, phosphorus inputs have been above 400 metric tons since 1993. SFWMD's data indicates that high phosphorus concentrations are associated with elevated water level, suggesting that flooding previously dry lake bottom could be part of the reason for increased nutrient and algal levels³.

In the 1980s, scientists suggested that nutrient recycling from the



Lake Okeechobee. Photo by Jeff Schardt

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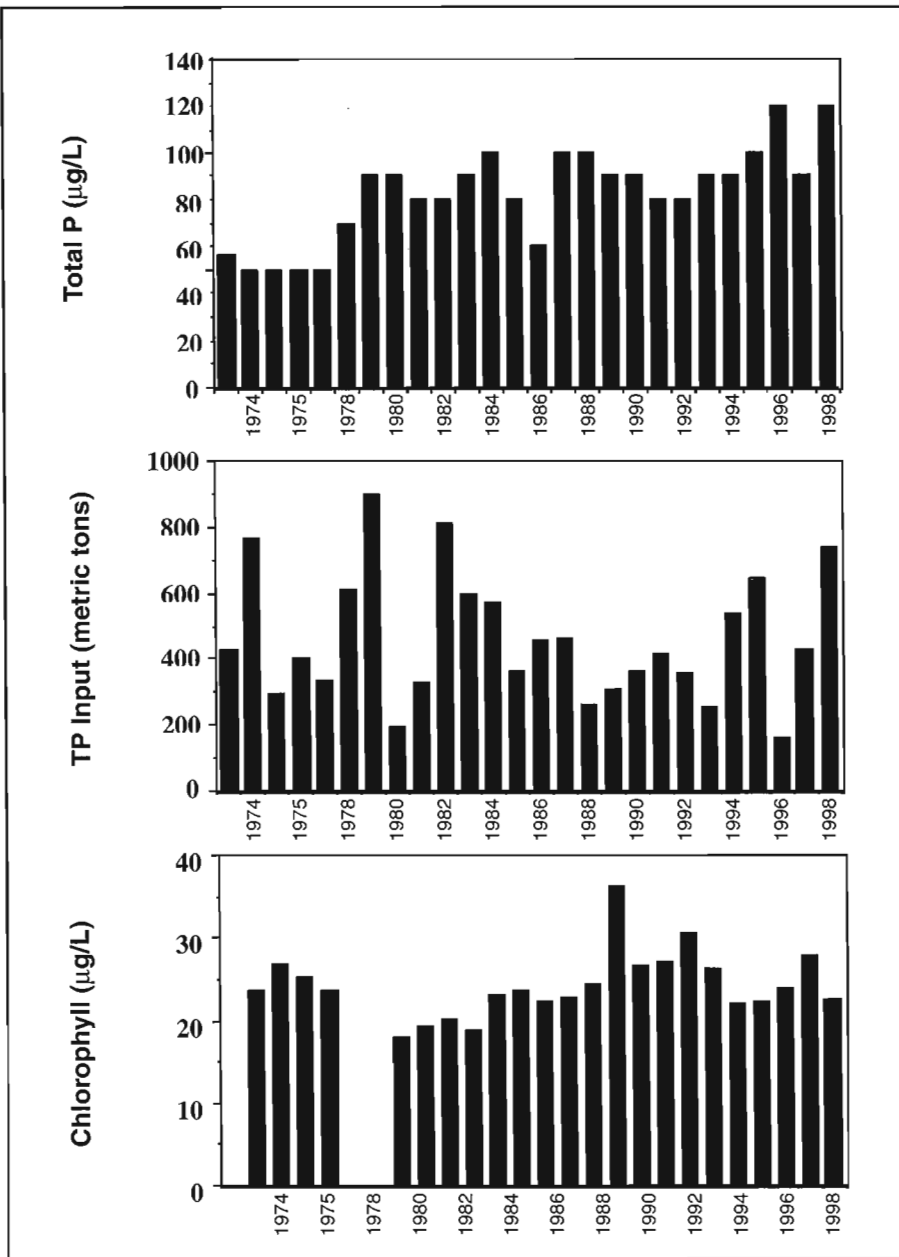


Figure 1. Annual (a) total phosphorus concentrations, (b) phosphorus inputs and (c) chlorophyll concentrations in Lake Okeechobee.

bottom sediments via wind resuspension was probably the dominant source of phosphorus for Lake Okeechobee. SFWMD's scientists subsequently demonstrated that wind activity affected TP concentrations as well as other lake chemical conditions. While inputs of phosphorus from the watershed are often substantial, scientists now recognize internal recycling of phosphorus is the dominant factor dictating open-water TP concentra-

tions. Furthermore, any nutrient recovery resulting from proposed nutrient-control programs will not be observed for several decades or centuries⁴!

Open-water Algal Biomass versus TP Concentrations

When TP concentrations increase in a lake, concern focuses on what will happen to long-term algal levels (chlorophyll). Phosphorus is often the primary limiting nutrient for

algae, but not necessarily the limiting environmental factor. The upsurge in TP between 1973 and 1998 has not, as predicted, corresponded to an increase in open-water chlorophyll concentrations at Lake Okeechobee (Figure 1c).

Open-water chlorophyll concentrations have remained relatively constant, averaging only 24 µg/L between 1973 and 1998. Lack of a response is not unexpected, as nutrients are not the primary limiting environmental factor. Suspended sediments, resulting from the resuspension of bottom sediments, cause low light availability. Without light, algae can not grow.

There is also a positive relationship between water levels and algal abundance in the near-shore/open-water interface region. Transport of phosphorus-laden water from open-water to the southern and western near-shore zones is a dominant factor affecting near-shore algae. So, while there may be a relationship between nutrients and near-shore algae, serious concerns regarding what effect nutrient reduction, if achieved, will have on the lake's algal abundance, arise.

Chlorophyll concentrations in open-water should average between 12 and 18 µg/L if nutrient concentrations (TP = 40 µg/L and TN = 900 µg/L) proposed by LOTAC are reached³. Large seasonal and spatial variations in algae (chlorophyll less than 10 µg/L to more than 100 µg/L) occur at Lake Okeechobee. An expensive monitoring program would be needed to detect the predicted reduction. This of course assumes that phosphorus would become the limiting environmental factor.

Annual open-water chlorophyll estimates have averaged between 18 and 36 µg/L from 1973 to 1998. This type of change is well within the expected year-to-year variation for Florida and North America lakes. If light was not a limiting environmental factor and phosphorus was the sole limiting nutrient, scientific models indicate that chlorophyll

concentrations will still exceed SFWMD's definition of an algal bloom (chlorophyll concentration greater than 40 µg/L) in both the open-water and near-shore zones after any nutrient reduction program!

Water Clarity versus External TP Inputs

The public does not judge lake quality by phosphorus or chlorophyll concentrations. Clear water is assumed to be good and greenish or turbid water is bad. Water clarity has averaged less than 0.8 m in the open-water between 1973 and 1998. Low water clarity has been observed since the 19th century.^{5,6} In 1887, it was written that winds tossed the water into "majestic billows, which rake up the bottom and bring to the surface a considerable infusion of sand, rendering the surface murky. The water itself, when not disturbed, is fairly clear and practically agreeable although held in bad repute by the few who have visited its shores." Water clarity is not related to algal levels and no impact can be expected from nutrient control. More importantly, the public will never see any difference in water clarity!

Fish Populations versus External TP Inputs

Perhaps the foremost concern with nutrient enrichment is damage to the sportfish population. Eutrophication has impacted some fish in northern lakes by causing a loss of oxygen in shallow ice-covered lakes or deep lakes with temperature stratification. Lake Okeechobee is a shallow subtropical lake. It never has ice cover and wind mixing prevents thermal stratification. The lake also supports warmwater fish (for example, largemouth bass and black crappie), not coldwater fish (for example, trout and salmon) typical of many northern lakes.

Demise of Lake Okeechobee's recreational fisheries has been predicted unsuccessfully since the mid-1970s. Fisheries studies of Florida lakes have shown that chlorophyll of



Lake Okeechobee Marsh. Photo by Jeff Schardt

240 µg/L has no significant impact on sportfish⁷. Lake Okeechobee has long-term chlorophyll less than 25 µg/L and never averages above 40 µg/L on any given year. Florida lakes also do not experience a decrease in fish species with nutrient enrichment. Consequently, government agencies, including the Florida Fish and Wildlife Commission, fertilize lakes to increase sportfish. Lake Okeechobee's sport fishery is, therefore, not in danger of imminent collapse from nutrient enrichment!

The 40 µg/L TP Goal

Since the 1980s, the appropriateness of selecting an open-water TP goal of 40 µg/L has been questioned. Reaching 40 µg/L might be feasible, but there is a scientific uncertainty. A TP of 20 µg/L was originally defined as the boundary between mesotrophic and eutrophic lakes in the 1970s. Florida researchers thought Florida lakes produced less chlorophyll per unit phosphorus than northern lakes so they modified the boundary value to 40 µg/L. They also called the phosphorus-loading boundary derived from the 40 µg/L target the "maximum allowable or critical" loading rate.

Most evidence indicates Lake

Okeechobee was not mesotrophic, but eutrophic. If a lake is eutrophic, then having a phosphorus concentration above 20 µg/L and a phosphorus loading rate above the critical loading rate is to be expected. Changing to 40 µg/L should have been rejected immediately based on widespread experience, but now we know that there is no basis for assuming Florida lakes develop less chlorophyll per unit of phosphorus than northern lakes. Selection of the 40 µg/L TP goal is arbitrary!

There are few historical open-water phosphorus data. Some near-shore measurements made in the 1950s have been relied upon to suggest TP concentrations are now 2- to 3 fold higher and that it might be possible to reach a TP of 30 µg/L. Scientists have admitted that there are interpretation problems. But, when the open-water cannot be sampled, measurements from the lake's outlet are often sought as a surrogate measurement. The St. Lucie Canal, a major Okeechobee outlet, was also sampled in the 1950s and a TP of 97 µg/L was obtained. Measurements made by SFWMD since 1973 indicates that outlet measurements are related to current open-water phosphorus measure-

ments. Lake Okeechobee's open-water TP concentration was, therefore, probably substantially higher than 40 µg/L prior to 1973.

Modeling of SFWMD's 26 years of data predicts an open-water TP of 52 µg/L, excluding atmospheric deposition. USEPA estimates an atmospheric deposition of 71 metric tons, which could potentially increase in-lake TP concentrations an additional 12 to 22 µg/L. If atmospheric deposition is constant and only lake volume changes, only once does a predicted concentration approach 40 µg/L, which is the low water in-flow year of 1996. The target phosphorus goal should be at least 52 µg/L, not 40 µg/L. Considering atmospheric deposition, it should be greater than 60 µg/L. Selection of these values leads to the conclusion that the annual phosphorus input has to be higher than the critical loading rate recommended by LOTAC, not lower.

The Total Maximum Daily Load Approach (TMDL)

Annual TP inputs to Lake Okeechobee averaged 519 metric tons between 1973 and 1984. After 1990 when many nutrient control programs were implemented or close to implementation, TP inputs averaged 442 metric tons. Only 5 years out of 26 years had inputs equal to or below LOTAC's recommendation of 311 metric tons.

USEPA, in compliance with the judicial Consent Decree, established a proposed TMDL of 198 metric tons for phosphorus. USEPA used SFWMD's Lake Okeechobee Water Quality Model and the target phosphorus of 40 µg/L in establishing the TMDL. USEPA concluded the maximum assimilative capacity of the lake was 285 metric tons of TP, but predicted it would take between 1000 and 1500 years to achieve the in-lake TP goal of 40 µg/L.

USEPA concluded that a restoration time period greater than 1000

years was not reasonable, but considered 198 metric tons as an achievable phosphorus load. Selection of the 198 metric ton value indicated the lake might be restored in 200 to 220 years! Phosphorus inputs to the lake have been below 285 metric tons only 4 years between 1973 and 1998. Inputs have been below 198 metric tons only three times, with the lowest inputs occurring during low water-input years. Highest inputs occur during high water-input years, raising considerable doubt whether the proposed TMDLs can be achieved because of the direct relationship between phosphorus and water inputs³. Based on water input alone, annual TP inputs should average about 450 metric tons, not 198 metric tons.

Conclusion

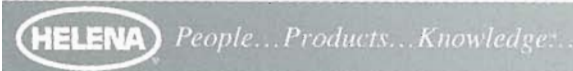
USEPA's proposed TMDL for Lake Okeechobee is totally inappropriate. Given that USEPA is pro-

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posing a 200+ year restoration and inputs sought by LOTAC constitute a restoration of 1000+ years, nutrient control should not be the highest priority. Continued emphasis on phosphorus control will result in the expenditure of massive amounts of public funds with little to show for the "pollution" control efforts because there is no relationship between the lake's open-water TP concentrations and external phosphorus inputs.

Internal processes of nutrient recycling will control in-lake nutrient concentrations for decades. There is no relationship between algae and TP in Lake Okeechobee. Nutrient control also will have no positive effect on water clarity or Lake Okeechobee's recreational fisheries. So, will stringent phosphorus control improve the overall quality of Lake Okeechobee? The answer must be an emphatic No!

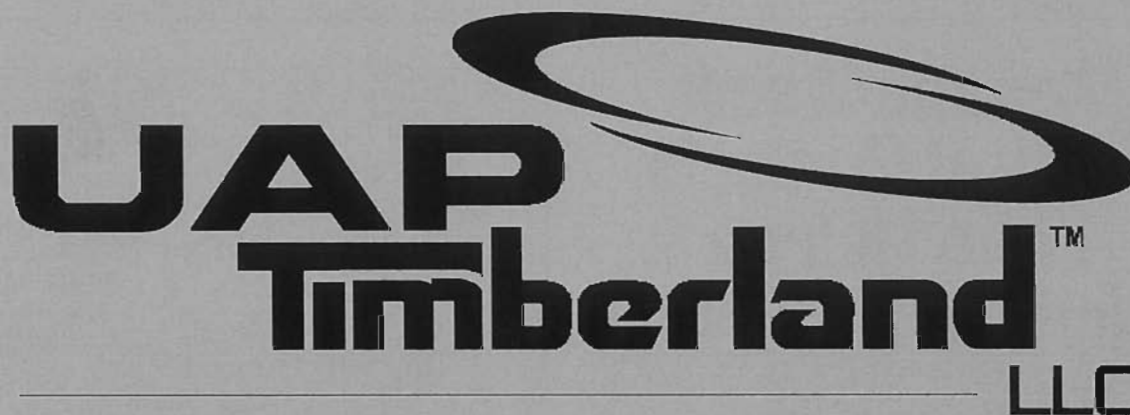
If we assume the measured water in-flows to Lake Okeechobee

between 1973 and 1998 reflect natural climatic variation, phosphorus inputs should average 450 metric tons. Even if a conservative approach is taken, phosphorus loads should be no less than 400 metric tons. If an in-lake phosphorus concentration of 50 µg/L is more realistic than 40 µg/L, estimates for watershed loading approach 442 metric tons. Increasing the in-lake target goal to 60 or 70 µg/L predicts inputs of 530 and 619 metric tons respectively. These are values close to those measured since the dairy buy-out program. Given USEPA's estimate of a 200+ year restoration time, it is time to take a less stringent and more realistic position on phosphorus control.

The greatest factor influencing Lake Okeechobee's recreational fisheries is water-level fluctuation. Maintaining high water levels causes loss of aquatic plants due to light limitation and wind action. Low water levels stimulate the

growth of submersed plants. Aquatic plants are important fish habitat in this large lake. Managing water-level fluctuation for aquatic plants rather than nutrient control will have the best chance of benefiting the lake's sportfish. This management option is relatively inexpensive compared to nutrient control and is something that can be implemented relatively easily and quickly. However, fluctuating water levels will stimulate plants like hydrilla and water hyacinth. So the political and citizen support that the Lake Okeechobee Aquatic Plant Management Interagency Committee has attained needs to continue to be strengthened so that the 1980's debacle over water hyacinth control (stopping all herbicide usage) does not repeat itself.

Decisions regarding management actions are not just of scientific interest. Actions affect not only the lake, but people too! Human activity in the Lake Okeechobee watershed has



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changed attributes of the lake. There are towns, cities and important agricultural enterprises. The lake has water outlets that didn't exist prior to humans. There is a massive dike, the Hoover Dike, around most of lake and water levels have been manipulated for flood control and water supply. There is also an extensive marsh that has developed at the lake since the construction of the Hoover Dike. And certainly, human activity has increased the input of phosphorus to the lake. However, the assumption that cultural eutrophication has adversely affected the lake over the last 60 years must be questioned!

Endnotes

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⁵Thompson, M. 1878. *The Witchery of Archery*. C. Scribner's Sons, New York.

⁶Heilprin A. 1887. Explorations on the West Coast of Florida and in the Okeechobee Wilderness. Wagner Free Inst. Sci., Philadelphia.

⁷Bachmann, R. W., B. L. Jones, D. D. Fox, M. Hoyer, L. A. Bull, and D. E. Canfield Jr. 1996. Relations between trophic state indicators and fish in Florida (U.S.A.) lakes. *Canadian Journal of Fisheries and Aquatic Sciences* 53(4): 842-855.

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**The Aquatic Plant
 Management Society Announces
 Annual Student
 Paper Contest**

The Aquatic Plant Management Society is soliciting student papers for the upcoming annual meeting to be held July 21-24, 2002 at the Keystone Resort in Keystone CO. Presentations on the biology or ecology of aquatic plants, control methods (biological, chemical, mechanical, cultural), or restoration projects involving wetland or aquatic plants are solicited. Papers that emphasize nuisance algae control or ecology, the impact of aquatic plant management on fisheries, and the relationship between aquatic plant management and water quality are also highly encouraged.

The APMS has a strong ethic of student support and all attendees will be provided free room and board at the Keystone Resort, waiver of registration fees, and banquet meals and functions. In addition, 1st, 2nd, and 3rd Place prize money will be awarded as well as copies of Sculthorpe's book "The Biology of Aquatic Plants." This meeting presents an opportunity for students to develop their presentation skills, learn about the field of aquatic plant management, meet with key government, university, and Industry representatives, and meet peers with similar educational or professional interests.

For more information
 on the contest please contact by mail, phone, or e-mail.

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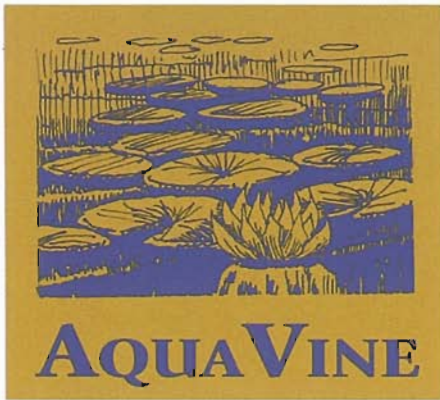
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**FAPMS Board Meeting—
all are invited!**

April 16, 2002, at 10:00 AM, Todd Olson 800-327-8745

**Hydrilla Extends its
U.S. Range**

Mr. Rob Gatewood, conservation agent for the Town of Barnstable, Massachusetts provided the following information:

Hydrilla has recently been identified in Long Pond, a 49 acre kettle

pond on Cape Cod, Massachusetts! Mr. Ron Sirch of the Association for the Preservation of Long Pond collected samples of this invasive plant, which were subsequently identified as hydrilla by botanist Barre Hellquist. Immediately after the positive identification, public boat access to Long Pond was closed until further notice.

Long Pond is located in Centerville, within the Town of Barnstable on Cape Cod. It has an average depth of 9 feet, so it is likely that hydrilla can effect most of this lake and become a source of infestation to surrounding lakes and ponds. The Town of Barnstable and the Association for the Preservation of Long Pond are working together to provide funding to develop and implement a hydrilla management plan. For more information on this and other nonindigenous aquatic species infestations including a current US range map please visit <http://nas.er.usgs.gov/plants>, and click on "Hydrilla new to Massachusetts."

Fire ants On the Move!

Red imported fire ants (RIFA) are widely established in the southeastern USA, with smaller populations in New Mexico, Arizona, and Nevada; now they are expanding their range in California. They have been found in southern California and the San Joaquin Valley. Just recently, however, they have been found as far north as Sacramento County. Read about it in this press release: www.cdffa.ca.gov/phpps/pdep/rifa/Sactoants.pdf

Parkway Research Acquired by Brandt Consolidated

Pleasant Plains, Illinois — January 17, 2002 — Brandt Consolidated, Inc. a leading manufacturer of liquid fertilizer and micronutrient products, announced today that it has acquired the operations of Parkway Research of Houston, Texas, a manufacturer of turf and horticultural maintenance chemicals and fertilizers. The acquisition of Parkway underscores Brandt's

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commitment to its expanding leadership role in the "green industry," and follows the acquisition of Agra Chem of Avon Park, Florida last summer. Contact Ray Kimmel at 800.252.2905 for more information.

New Sonar Precision Release Herbicide

SePRO Aquatics announced their New Sonar* Precision Release* formulation at the October 2001 FAPMS meeting in Daytona Beach, Florida. The new, U.S. EPA registered Sonar formulation provides a faster, more predictable release of fluridone in a pellet formulation. Contact Mark Mongin at SePRO (1-800-419-7779) for more information.

Aquatic Weed Control Short Course 2002

May 19-24, 2002 Fort Lauderdale Marriot North, This short course will feature aquatic weed control, upland and invasive weed control, aquatic plant culture and revegetation, and a training session on the new natural areas weed management pesticide applicator category. For more information visit www.conference.ifas.ufl.edu/aw or call Dr. Vernon Vandiver at 954-577-6316.

Editorial

Continued from page 3

is now prudent to take the time needed to further evaluate what has been done so far in the name of nutrient control and focus all available resources on the "holistic" management of Lake Okeechobee.

This does not mean that all research should be ceased or that all the nutrient management efforts be eliminated. The State of Florida, however, should focus on other activities such as aquatic plant management and water level management to maintain Lake Okeechobee's recreational fisheries. The debates regarding the potential effects of nutrient enrichment epitomize current "School of Thoughts" in the aquatic sciences. There must be a new and open discussion of all the issues at Lake Okeechobee in order that we not become victim to the pitfalls President Eisenhower warned us of. The Environmental-Industrial Complex must not hold the people of Florida and their elected-leaders hostage!

Dr. Dan Canfield, University of Florida

Aquatic Plant Scholarship Grant!

The South Carolina Aquatic Plant Management Society, Inc. is seeking applications for its annual scholarship grant. The Society intends to award a \$2,000 grant to the successful applicant in the Fall of 2002.

Eligible applicants must be enrolled as full time undergraduate or graduate students in an accredited college or university in the United States. Course work or research in an area related to the biology, ecology or management of aquatic plants in the Southeast is also required.

Applications must be received no later than May 1, 2002, and are available in the internet at <http://water.dnr.state.sc.us/water/envaff/aquatic/scapms.html>. Other factors being equal, preference will be given to applicants enrolled in Southeastern and South Carolina academic institutions. The successful applicant may be requested to present an oral report at the annual meeting of the Society.

For additional information, contact

Danny Johnson
SC Department of Natural Resources
2221 Devine Street, Suite 222
Columbia, SC 29205
803-734-9099, or e-mail,
johnsond@water.dnr.state.sc.us



John Rodgers found this striking creature stranded about 600 feet offshore on Ed Medard Reservoir, Hillsborough County. It is an Eyed Click Beetle (*Alaus oculatus*). The larvae of this beetle are predatory on the larvae of wood boring beetles and are usually found in rotting tree stumps. While not an aquatic insect, this beetle was likely flying, fell into the water, and then climbed out onto the safety of the cattails. Dr. William Kern, University of Florida, provided information on this critter.

Photo by John Rogers



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